

2-2 Logic

Statement-Sentence that is either true or false, but not both

Truth value-whether it is true or false

Negation-opposite meaning as well as opposite truth value (Symbol \sim)

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Example:

p: September has 30 days. _____

T

not p or $\sim p$

Sept. does not have 30 days.

(The letters p, q, and r are typically used to represent statements.)

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Compound statement--

Combining 2 or more statements

AND OR

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q: September is the 9th month of the year.

p and q:

Sept. has 30 days and
Sept. is the 9th month of
the year.

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AND-conjunction Symbol \wedge $p \wedge q$ "p and q"

True,
when both are TRUE

False,
when one is false or both false

r: A square has 4 congruent sides.

T

True or False

$p \wedge q$ T

$p \wedge r$ T

$\sim p \wedge r$ F

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OR-disjunction Symbol \vee $p \vee q$ "p or q"

True,
when either statement is True
or Both True

False,
when both statements are false

True or False

$p \vee q$ T
T T

$\sim p \vee \sim r$ F
F F

$\sim q \vee r$ T
F T

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Complete the following example on your own.

\underline{F} p: AB is proper notation for "line AB"

\underline{T} q: centimeters are metric units

\underline{F} r: 9 is a prime number

Determine the truth value for #s 1-5.

1. $p \vee q$ \underline{T} 2. $r \vee q$ \underline{T} 3. $p \wedge q$ \underline{F}

4. $\sim p \vee q$ \underline{T} 5. $p \vee r$ \underline{F}
 $\underline{T} \quad \underline{T}$

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Truth Tables

Negation	
p	$\sim p$
\underline{T}	\underline{F}
\underline{F}	\underline{T}

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AND			OR		
Conjunction			Disjunction		
p	q	$p \wedge q$	p	q	$p \vee q$
T	T	T	T	T	T
T	F	F	T	F	T
F	T	F	F	T	T
F	F	F	F	F	F

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Tautology-Compound sentence that is always true.

Ex: You are in school, or you are not in school.

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$\sim p \vee q$

p	q	$\sim p$	$\sim p \vee q$
T	T	F	T
T	F	F	F
F	T	T	T
F	F	T	T

 $\sim p \wedge \sim q$

p	q	$\sim p$	$\sim q$
T	T	F	F
T	F	F	T
F	T	T	F
F	F	T	T

$\sim p \wedge \sim q$
F
F
F
T

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3 Terms

 $p \vee (\sim q \wedge r)$


p	q	r	$\sim q$	$\sim q \wedge r$	$p \vee (\sim q \wedge r)$
T	T	T	F	F	T
T	F	T	T	T	T
T	T	F	F	F	T
T	F	F	T	F	T
F	T	T	F	F	F
F	F	T	T	T	T
F	T	F	F	F	F
F	F	F	T	F	F

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$(p \vee q) \wedge \sim r$



p	q	r	$\sim r$	$(p \vee q)$	$(p \vee q) \wedge \sim r$
T	T	T	F	T	F
T	F	T	F	T	F
T	T	F	T	T	T
T	F	F	T	T	T
F	T	T	F	T	F
F	F	T	F	F	F
F	T	F	T	T	T
F	F	F	T	F	F

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HW
 p72-73
 18-29(T or F only),
 30-32

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